THE IMPACT OF CHILDREN'S SCRIPT MEMORY ON SUGGESTIBILITY

By

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Suggestibility and recall performance regarding a specific occurrence of a controlled repeated event were examined. Twenty-four 4- to 5-year-olds and twenty-four 7- to 8-year-olds participated in repeated sessions of a novel event. Half of the children in each age group took part in 2 sessions, and half experienced 4 sessions. Items within the event were fixed across sessions, varied once, or always varied. In a third or fifth session, children responded to a memory interview targeting the final game session. Questions in the interview focused on central and peripheral information, and item variability. Questions included misleading information that was either internal to the script or external to the script. The interview included 3 general probes, 12 direct probes, and 28 forced-choice questions. The forced-choice questions were divided equally into misleading and non-misleading questions. The older children were less suggestible than the younger children. However, as children recalled more they were also more

suggestible. Additionally, the children made more script-consistent errors than external errors. Younger children were more suggestible for central than for peripheral information, but both age groups recalled more central information. As variability increased, suggestibility increased, although increased experience led to a different pattern of responding for older children. Additionally, the children were more suggestible in response to non-misleading questions rather than misleading questions. Results were interpreted in terms of script theory and the schema confirmation-deployment hypothesis, as well memory trace strength theory and source-monitoring theories. This is the first research to examine questions of age, information centrality, information variability, and level of recall as they pertain to both suggestibility and script memory in children.

INTRODUCTION

Suggestibility concerns the extent to which the encoding, retrieval, and reporting of events can be influenced by a range of social and psychological factors (Ceci & Bruck, 1993). The degree to which a person is suggestible has important legal implications (e.g., eyewitness testimony), and important implications regarding the functioning of memory. In the law, the suggestibility of children is of particular concern when children are needed as witnesses. Issues of false accusation, innocent imprisonment of the accused, children's credibility with jurors and judges, and protection of the child are encompassed by this concern. The legal dogma in the United States holds that it is better for 100 guilty people to go free than for one innocent person to be falsely imprisoned (Bottoms & Goodman, 1996). The extreme tension surrounding this issue within our legal system stems from the inherent conflict between a defendant's Sixth Amendment right to confrontation and our society's belief that one of the paramount duties of the courts is to protect children. Although this tension has existed for at more than 80 years, only in the last 15 years have cases involving children been so prevalent and so widely publicized (McGough, 1994).

Children's involvement in the forensic context may be more widespread than is generally realized, because children may be involved in an array of proceedings. Children testify as witnesses in delinquency proceedings where they may provide evidence of another child's crime; in dependency cases, where they may give evidence in

support of the state's case of abuse or neglect against the child's caretaker; in divorce cases; in custody disputes; and in hearings regarding visitation issues, to name a few. Thus, it is apparent that a true need to determine under what conditions children may and may not be suggestible exists within our legal system.

Suggestibility Research

Although a few psychological studies have examined children's eyewitness testimony within a legal setting (e.g. Goodman, Taub, Jones, England, Port, Rudy, & Prado, 1992), the majority have been basic laboratory investigations. Suggestibility is most often measured by exploring the extent to which participants incorporate in their memory reports postevent information that has been suggested to them. Two main paradigms exist for testing suggestibility. In the three-phase procedure, participants first experience the event (usually a story or video), then after a delay, half of the participants receive misleading information about the story (phase two). In phase three, the participants experience a second delay and then complete a forced-choice recognition test to assess their memory for episodes about which they have been misled (Loftus, Miller, & Burns, 1978). In the two-phase procedure, the participants experience the event, and after some delay, the participants are interviewed about the experience using some misleading and some non-misleading questions (Goodman, Rudy, Bottoms, & Aman, 1990). The two-phase procedure is most often utilized in naturalistic settings. Of the two procedures, the two-phase procedure most closely approximates a forensic experience. Both the two-phase and the three-phase procedures usually include a unique, one-time event. Little research has addressed the effect of repeated experience on recall

in response to suggestive questioning. The current study proposes to examine children's suggestibility when questioned about an event for which they possess a memory script.

Research regarding the suggestibility of children consistently indicates that young children are often more suggestible than older children and adults (Cassel & Bjorklund, 1995). Nevertheless, even young children can recall events accurately more than a year after the event (Fivush & Shukat, 1995). The findings of the last decade show that children's suggestibility is influenced by a variety of factors that sometimes increase their susceptibility to suggestion and sometimes increase their resistance to it (Quas & Goodman, in press; see Saywitz & Goodman, 1996, for a review). Some of the factors influencing suggestibility are (a) the type of experience the participant has with the event, (b) the conditions surrounding the interview, (c) the language used, and (d) the type of information to be recalled.

Whether or not the "witness" participated in the event influences the suggestibility of the witness. For example, Rudy and Goodman (1991) manipulated the type of event experienced by 4- and 7-year-olds. The children were either participants in or bystanders to a social interaction with an unknown male. The children who participated in the event were generally more resistant to suggestion than the bystanders.

Additionally, the context of the memory interview can affect the accuracy of children's reports. Carter, Bottoms, and Levine (1996) assessed children's memory for a play session. The children were interviewed by either an intimidating interviewer, or a supportive interviewer. As in other research (Goodman, Bottoms, Schwartz-Kenney, & Rudy, 1991; Saywitz, Geiselman, & Bornstein, 1992), Carter et al. found that children who were questioned by a supportive interviewer made fewer memory errors and were

less suggestible than children who were questioned by an intimidating interviewer. Other research indicates that reinstating the context of a low-stress event aids recall of the event (Hayes & Delamothe, 1997).

The types of questions asked during the interview also influence suggestibility. In research utilizing the three-phase procedure, general probes, or open-ended questions, are often used in the interview to test how much of the suggested information has been integrated with event memory. General probes do not provide any information about the event, and are thus considered to be the least likely to produce suggestibility. Children as young as 3 years can provide accurate information in response to free-recall questions (e.g., Fivush, 1993). However, children of all ages do not always provide complete memory reports in response to general probes (Lamb, Sternberg, & Esplin, 1995; Saywitz, Goodman, Nicholas, & Moan, 1991). Thus, interviewers must often rely on more direct questioning to obtain detailed accounts from children.

An example of a direct question would be, "Whose house did you go to after school?" To answer direct questions, children must communicate information stored in memory, but they are prompted by the content of the questions. Hence, the information contained in the prompt may mislead the child by implying that an answer to the question exists. In the example above, the question implies that the child went to someone's house after school, when in fact, the child may not have gone anywhere. Although the amount of information reported increases with the use of direct probes, inaccurate responding also increases (but see Sternberg, Lamb, Hershkowitz, Esplin, Redlich, & Sunshine, 1996, for a different analysis; see Ceci & Bruck, 1993, and Saywitz & Goodman, 1996, for reviews).

Children appear to be the most suggestible when faced with forced-choice questions (Powell & Thomson, 1996). This may be especially true when the forced-choice question is misleading, such that information that is not a part of the event is included. For example, "Didn't you go to Sara's house after school?" when the child actually went to Stephanie's house provides information that did not occur, but suggests to the child that it did. Thompson, Clarke-Stewart, and Lepore (1997) interviewed 5- to 6-year-olds after they witnessed a janitor either cleaning or playing in a room. The children in this study provided descriptions that were consistent with their experience in response to general probes. However, when answering forced-choice (yes/no) misleading questions, the children's descriptions were consistent with the interviewer's suggestions.

An additional influence on suggestibility that relates to question type is the type of information the children are asked to recall. Children are more likely to give incorrect responses and to be more suggestible regarding information peripheral to the event. Details that do not affect the flow, or main actions of the event, and that may not be salient during the event are less likely to be remembered. However, information that is central to the event, or that relates to a core action of an event involving the child, is likely to be better remembered and therefore less subject to suggestion (Goodman et al., 1990; Siegal & Peterson, 1995).

Theoretical Explanations of Suggestibility

Although research clearly demonstrates that children are suggestible and that many factors may influence their suggestibility, no one theory completely explains suggestibility. Two groups of theories have emerged: theories that focus on the strength

of the memory trace, and theories that focus on children's ability to monitor the source of their knowledge.

Memory trace strength theories include those that claim that the memory is changed, or overwritten, and those that suggest that the original trace exists but must compete with the memory trace for the suggested information (Brainerd & Reyna, 1996; Ceci, Ross, & Toglia, 1988). Both types attribute suggestibility to memory impairment. The crux of the trace strength theories is that the incorporation of misinformation into the memory occurs as a function of the trace strength, such that weaker traces are more susceptible to change or competition. According to trace theorists, a trace is a bundle of features that represent the original event, and this bundle may be more or less integrated. When the features are tightly bundled, incorporation of suggested features is less likely (Brainerd, Reyna, Howe, & Kingma, 1990).

Trace strength theories suggest several predictions regarding suggestibility. One is that age differences will occur because younger children encode weaker traces (Brainerd et al., 1990). Several studies show that children with weaker memories of the original event are more vulnerable to suggestion (Brainerd & Reyna, 1996; King & Yuille, 1987). However, a second prediction is that older children may be more suggestible than younger children when the younger children possess greater knowledge of the event in question, or when the older children's greater knowledge leads them to make erroneous inferences (Ceci & Bruck, 1993). Duncan, Whitney, and Kunen (1982) found just such an effect.

Source monitoring theories of suggestibility argue that exposure to misleading information leads children (and adults) to come to believe that they actually remember

seeing the events that have only been suggested to them (Ackil & Zaragoza, 1995). The process of recalling the source leads to the misattribution. That is, according to Johnson and colleagues (see Johnson, Hashtroudi, & Lindsay, 1993; Johnson & Raye, 1981), memory for source is a product of a decision making process. Memory representations are assumed to contain characteristics that reflect the specific conditions under which they were acquired. Judgments about source are made by evaluating the nature of these characteristics. Source judgments may be influenced by visual detail, spatio-temporal detail, supporting memories, and general knowledge. The source monitoring literature shows that age differences in source monitoring depend on the difficulty of the discrimination subjects have to make (Foley, Aman, & Gutch, 1987; Johnson, Raye, Hasher, & Chromiak, 1979). For example, Foley and Johnson (1985) found that 6-year-olds performed as well as older children and adults when distinguishing what they said and did from what they heard someone else say or do. The discrimination involved was considered relatively simple, since it was a discrimination between the child's own actions and the actions of another. However, these same children made more errors than adults when discriminating between actions they performed and actions they merely imagined themselves performing. Discriminating between memories derived from similar sources (both memories refer to the child), then, is more difficult.

Situations in which children are misled by suggestion also involve discriminations between memories from similar sources. Both the witnessed information and the suggested information refer to the same set of objective events and involve the experience of the child. Ackil and Zaragosa (1995) found that 5- to 7-year-olds were

more likely than 9- and 11-year-olds to confuse suggested items with actually perceived events, although the older children were also somewhat susceptible to this error.

Ackil and Zaragoza (1995) suggest that source misattribution may interact with memory impairment related to trace strength, although source misattribution and memory impairment are separate processes. Considered together, memory trace strength theories and source monitoring theories indicate that younger children are more suggestible because they have weak memory traces, whose features are not tightly bundled. Because these features do not cohere well, features related to source may not be included as a part of the memory trace, especially if repeatedly experienced events have similar sources. As children grow older, memory traces strengthen, and as a consequence, features of an event related to source are more likely to be incorporated into the memory trace. Eventually, highly similar sources may be differentiated, although this process does not reach perfection: Adults often make misattribution errors when recalling sources of information. Additionally, the increase in source misattributions found with increased delay in testing may occur because with time, the integrity of the memory trace degrades. As the trace becomes less integrated, features related to source may be lost. This may be especially true for weak traces, which may have originally included only a few source features.

Both trace strength theories and source monitoring theories suggest that knowledge of the event may relate to suggestibility. Memory traces should increase in strength with increases in knowledge, allowing more source-related features to be encoded, thereby increasing both memory for the event and the ability to correctly recall the source of different event experiences. Where an event is congruent with existing

knowledge, a positive relationship may occur between the amount of knowledge and children's resistance to suggestion (Ceci & Bruck, 1993). However, most studies of children's suggestibility examine only one-time occurrences of events. Nevertheless, issues regarding children's suggestibility, such as child abuse, most often involve repeated episodes of an event. Thus, evidence from the scripted-knowledge literature may provide an additional theoretical basis for suggestibility, one that may supplement both trace strength and source monitoring theories.

Scripts

Scripts are spatially, temporally organized sequences that specify the actions, actors, and props most likely to occur during any given instance of an event (Nelson & Gruendel, 1981). Scripts are assumed to aid in the recall of past experiences. Scripts form very quickly; children report the component actions of an event in correct temporal sequence even after the first occurrence of the event (Hudson & Nelson, 1986). The similarity of episodes of an event seems to influence the subsequent recall of both the standard information and the variations. Increasing experience with the same event improves recall of that event, but diminishes recall for one-time variations (Hudson, Fivush, & Kuebli, 1992). However, items that continuously change become marked as changing within the script. Kuebli (1990) compared the recall of 4- and 7-year-olds for items that changed once across four sessions and items that varied in each episode. The children did not mention any of the variations in spontaneous recall. However, when directly questioned about targeted varying items, both ages demonstrated better knowledge of change for the always varying items than for the items that changed in only one session (although the effect was more pronounced for older children). Keubli

hypothesized that the recurring variations focused children's attention on the aspects of the event which could be expected to change, and thus those changes were better remembered.

In another study, 3- to 5-year-olds visited a play room and took part in five-step activities either one or four times (Fivush, Kuebli, & Clubb, 1992). Each visit included one invariant activity and one variable activity. Consistent with other findings, older children mentioned variations more frequently than did younger children. Thus, while younger and older children can remember aspects of repeated events that remain stable as well as those that change, younger children have more difficulty recalling the changes.

Additionally, repetition of a variable event increases errors in recall compared to recall of a novel event. Most errors are references to information from a different occurrence of the event than the target episode (Fivush et al., 1992). Also, repeated exposure to an event increases the reporting of items at a general or abstract level without reference to the information particular to the episode being remembered (Fivush & Slackman, 1986).

Script theory proposes that with repeated experience of an event a script forms, and as the typical features of the event are abstracted, the memory of any one occurrence is weakened. The various exemplars of items are then represented only as possible slot fillers within the general script (Hudson et al., 1992).

Developmental differences in script memory, such as those found by Fivush et al. (1992), can be accounted for by the schema confirmation-deployment hypothesis posited by Goodman and colleagues (Farrar & Goodman, 1990, 1992; Goodman, 1981; Goodman & Golding, 1983). In this theoretical framework, two stages in the process of script or

schema functioning are proposed. When a person encounters an event, she attempts to activate a relevant script. If the script exists and is confirmed, the person need not attend to all aspects of the event. Instead, the person can attend to only the discrepant information, perhaps establishing a separate memory for this occurrence of the event, while relying on the script for the general information about the event. If the script does not exist or is still being formed, the person will have more difficulty establishing a separate memory for the episode, because the episode is being used in the formation of the script.

The schema confirmation-deployment hypothesis yields several developmental predictions. First, younger children take longer to develop and confirm scripts, and therefore they may be more dependent on scripts in recall of an episode of an event than older children (Farrar & Goodman, 1990). Thus, they may have more difficulty recalling the details of any specific episode of an event. In contrast, children who are in the schema deployment phase should able to recall unique episodic details (Farrar & Goodman, 1990).

Second, older children may make more inferences based on their script knowledge, and therefore incorrectly recall aspects of an event episode that did not occur, while recalling more of the details of the episode. In a study with third graders, sixth graders, and college students, Lindberg (1991) found that the older children and college students made more false attributions about an ambiguous event. When the participants were told that the target film depicted cheaters, the older participants reported cheating based on innocent acts. The younger children did not make attributions of cheating, presumably because they possessed poorly formed scripts for cheating.

Third, children with little event experience will be more suggestible for both central (core) and peripheral event information than children with greater experience, although this effect may be more pronounced for younger children, who form scripts more slowly. Also, younger children may be more suggestible regarding the peripheral information of an event. During early script confirmation, these children are more focused on the central aspects of an event, which are likely to be the core elements of the script. However, older children may be more suggestible for central information than for peripheral information. This is because older children are better able to confirm scripts, and thus their attention moves quickly from central (script-related) information to the details of the episode, leading the children to assume the central information based on their existing scripts.

Thus, script theories may provide an explanation of suggestibility. Younger children may be more suggestible than older children because they are overly dependent on scripted knowledge, but have scripts that are not yet well-formed. Older children and adults may sometimes be more suggestible than younger children because their greater knowledge may lead them to infer scripted information that is not part of the actual event. Further, script theories would suggest that developmental differences will occur in the type of information for which children are suggestible.

Although children's scripts may play an important role in their suggestibility, researchers are only beginning to address the influence of script memory on suggestibility. While several studies examining memory for medical procedures have included the amount of the child's experience with the procedure as a consideration, these studies have only contemplated the number of episodes the child experienced and

not the aspects of the event for which scripts may have developed (Goodman, Quas, & Batterman-Faunce, 1994; Ornstein, Baker-Ward, Myers, Principe, & Gordon, 1995). Therefore, the influence of script memory on suggestibility could not be examined.

Two recent studies have addressed the influence of scripts on children's suggestibility and accuracy of recall. The first, a study by Ricci and Beal (1997), examined the influence of prior knowledge on eyewitness memory. Five-year-olds participated in a scripted event (a birthday party) or a non-scripted play session. Both events included an unexpected intrusion in which a man stole a tool box. The children were interviewed after the event, using both direct probes and suggestive questioning. Results showed that children answered questions about the birthday party better than questions about the unexpected intruder. Also, children in the scripted-event condition answered more suggestive questions correctly and were more accurate in remembering details of the event than children in the play session condition. These results support the predictions of script theory and the schema confirmation-deployment hypothesis. Because children who participated in the birthday party were able to utilize an event script (as opposed to children who participated in the play session), they were able to attend to the details of the birthday party. Then, in recalling the event, these children could rely on their scripts for information about the general structure of the party and also recall the details of this specific party.

In a study conducted by Connolly and Lindsay (1997), novel events were included in order to control for amount and type of experience in investigating the influence of postevent misinformation on children's recall. Four-, 6-, and 8-year-olds participated in either one or four sessions including paper-folding activities and magic

tricks. Some of the items in the activities were always the same (fixed), and some always varied. Three days after the last session, non-occurring details were suggested, and the next day children received a memory interview targeting the final session. Although no age effects emerged, children who received repeated episodes of the event were more resistant to suggestion about fixed details of the target event and less resistant to suggestion about variable details than children who only participated in one session. According to script theory, the children who participated in four sessions were able to utilize their scripts to answer memory test questions. Details that were fixed across sessions were part of the script, and provided the information needed to reject false suggestions. However, the script did not contain information about the variable details, making it more difficult for the children to determine which of the possible options occurred during the target event.

A third study, although not directly involving measures of suggestibility, is relevant to the issue of script influence on recall accuracy. Powell and Thomson (1996) created a novel event including 20 target actions. Four- to 5-year-olds and 6- to 8-year-olds participated in either one session or six sessions. For half of the children, memory was tested after 1 week (as opposed to a 6 week delay). The effects of event repetition, age, and item frequency on recall of the final session were examined across three question types. As expected, children who experienced repeated sessions recalled more items that were common across sessions and fewer details specific to the target session in response to general probes.

In response to direct probes for target items, children in the repeated session condition provided fewer correct answers. It should be noted that all of the items

included in the direct probes varied across the six sessions such that one instantiation occurred twice and a second instantiation occurred four times. In the case of complicated events such as the one used in this study, where target items always vary and they vary differently for different instantiations, the schema confirmation-deployment hypothesis would predict that children would have difficulty remembering the various target items. Because items are dissimilar across sessions, scripts for the event would develop more slowly. This would be true for older and younger children, although younger children would lag behind older children in script formation. Thus, even the older children may have still been in the script confirmation phase, and therefore would be less able to attend to the non-scripted aspects of the target session. The younger children would be expected to perform even more poorly. When asked about the varying target items, children in both age groups recalled fewer target items because the primary focus of their attention during the target session was directed toward confirming their existing schemas of the event.

The errors made by the children in this study are the data most relevant to issues of suggestibility. Forced-choice questions were utilized to examine errors. Most errors made by the children in the repeated sessions condition were intrusions of details from other episodes of the event, and most of these intrusions involved instantiations that had been present in four sessions rather than in two sessions. Additionally, the younger children were less able to discriminate between episodes of the event than were older children. As previously described, the schema confirmation-deployment hypothesis accounts for the errors made by the children. Memory trace strength theories suggest that the instantiations experienced most often will have the stronger traces and therefore will

be better remembered. These items, then, are most likely to be part of the to-be-confirmed script. Because the children may have been involved in script confirmation, information from the script would be accessed to determine the correct answer to the forced-choice questions, rather than information from the specific target session. For the rememberer, the correct answer to the forced-choice question would seem to be the instantiation of the item experienced most frequently.

These results are relevant to issues of suggestibility because they imply that incorrect responses to misleading questions regarding scripted events might include the scripted alternative of the target item provided in the question. Even though scripted intrusions are still not correct answers, they are based on actual experience and are not incorporations of false information. However, Powell and Thomson (1996) did not include misleading questions in their research, and so children's suggestibility could not be evaluated. The present research proposes to evaluate suggestibility related to script-based errors by incorporating misleading questions that include items present in other episodes of the event but not present in the target episode, as well as items never present in the event.

Although these studies provide some initial findings regarding the role of scripts in children's suggestibility, many questions remain. First, how might memory performance and suggestibility differ as a function of testing for central versus peripheral information in a scripted event? When information centrality is considered in studies of suggestibility for one-time events, children are less suggestible for information central to the event (Goodman et al., 1990). Because central information is likely to be more quickly incorporated into an event script, younger children are expected to be less

suggestible when questioned about central information than when questioned about peripheral information. Also, younger children with less event experience will provide more incorrect responses to misleading questions involving central information than will younger children with more event experience. Less experienced younger children will be the most suggestible when questioned about peripheral information from the target episode. Older children, on the other hand, may be more subject to suggestion in response to questions about central information versus peripheral information, especially as event experience increases. These children will focus more on the details of the event that may fill out the script than on the common central items and therefore may better remember this peripheral information than the scripted central information.

Second, how might differing levels of item variability (fixed, varying once, and always varied) and information centrality interact to affect responses to misleading questions involving scripted events? Script theory predicts that memory for fixed central information will be the least suggestible, because it is most likely to be a part of the children's scripts. Repeatedly varying peripheral information will be the most suggestible information type. Repeatedly varying information is unlikely to become a part of the children's scripts, and peripheral information is less likely to receive attention during schema confirmation. However, children who are in the schema deployment phase are likely to be less suggestible regarding repeatedly varying and peripheral information than the children in the schema confirmation stage.

Third, what types of errors might be expected in response to misleading questions about scripted events? Will errors involve more suggested information that is internal to the script, or information that is suggested, but never experienced (external to

the script)? The Powell and Thomson (1996) study suggests that more errors will be made involving script-internal intrusions than external intrusions. However, item variability may affect reports of internal intrusions. For questions involving items that always vary, children may have difficulty determining whether the suggested exemplar was experienced. Thus, more external intrusions might be expected for misleading questions about always varying information than for fixed information or information that varies only in the target episode. This may be especially true for young children.

The present research examined the effects of scripted knowledge on recall of a specific instance of a controlled, repeated event in order to investigate these issues regarding suggestibility. Four- to 5-year-olds and 7- to 8-year-olds participated in two or four sessions of a novel event. Across the sessions, some items remained fixed, some varied only in the target (final) session, and some varied in every session. The children received a memory interview during a third or fifth session, one week after the target session. The interview included questions about central and peripheral as well as fixed and varying aspects of the event in the form of general probes, direct probes, and forced choice (yes/no) questions. In order to investigate the main hypotheses of this study, some of the forced-choice questions were misleading. Responses were coded and evaluated as correct, script-internal errors, or external errors. Age effects were examined in relation to all other variables.

Hypotheses

The effects of age, event experience, information variability, question type, and information centrality on suggestibility and recall were examined. The schema confirmation-deployment hypothesis indicates that children who are in the confirmation

phase will attend most to script-consistent information. Children in the schema-deployment phase, on the other hand, should attend most to script-inconsistent or episodic information, since these children will already have confirmed an existing script, and can rely on that script to provide the scripted information relevant to the current episode. It would be expected that younger children and those with less event experience would most likely be in the schema-confirmation phase, and older children and those with more event experience would most likely be in the schema-deployment phase.

Thus, it was expected that older children would be less suggestible and would remember more of all types of information (central, peripheral, fixed, varying, general, and specific) than would younger children. Children were expected to be less suggestible for fixed information than for varied once or always varied information. Additionally, the children's memory was expected to be more suggestible for peripheral information than for central information. An interaction was expected among age, event experience, variability of information, and centrality of information. Children were expected to be most suggestible regarding repeatedly varying peripheral information, especially the younger children. The younger children were expected to be the least suggestible in response to questions incorporating fixed central information. However, older children may be resistant to suggestion about fixed peripheral information and were considered to possibly be even less suggestible for fixed peripheral information than fixed central information. These results were expected to be mediated by amount of event experience.

Second, children were expected to make more errors in response to misleading questions than in response to non-misleading questions. However, an interaction of question type with age, information type, information variability, and event frequency

was expected to qualify these results. All children were expected to make more errors in answering misleading questions about always varying items. Also, the most errors in response to misleading questions were anticipated to be for items that always varied, and more errors in response to misleading questions were predicted to occur for items that varied once than for questions about fixed items. Repetition of the event usually results in more recall errors involving items present in other occurrences of the event, and when this error is made, the most frequently occurring instance of the erroneously recalled item is chosen as a response (Powell & Thomson, 1996). Also, it was expected that children would incorrectly select more information that is internal to the script than external to the script. Nevertheless, the children (especially the younger children) were expected to indicate more external intrusions when questioned about items that always vary than when questioned about fixed items or items that vary only in the target episode.

METHOD

Participants

Twenty-four younger children, ranging in age from 3 years 10 months to 5 years 6 months (M = 4 years 6 months), and 24 older children, ranging in age from 6 years 10 months to 8 years, 6 months (M = 7 years 7 months) were recruited from area day cares and schools. The younger group was comprised of 13 boys and 11 girls and the older group contained 12 boys and 12 girls. The younger group was 55% Caucasian, 29% Asian, 4% African American, 4% Hispanic, and 8% other. The older group was 71 % Caucasian, 25% African American, and 4% Asian. The research took place at the children's schools. Half of the children in each age group and gender participated in two event sessions and the other half participated in four event sessions.

Design

Stimuli used in the present research were constructed for this project in order to create a novel event. The game (Exploring Digestion) consisted of two sections: the dress-up section and the board section. For the dress-up section, clothing and instruments associated with scientists (see Table 1) along with 6 inch-square dice were assembled. A large chart detailing the order in which the clothing was to be donned was created. The dress-up segment of the game was based on a list of unusual learning activities (Abegglen, 1998), and was chosen because although most children have played dress-up,

few are likely to have included a chart and dice as part of the process. Thus, the procedure of dressing up was designed to be novel for the children.

For the board section, a giant game board consisting of colored squares was created (see Table 1), along with corresponding color cards. The board was designed so that the children would draw the cards from a pile, and then act as the game piece, moving around the board to the correct color. Colors were chosen rather than numbers or words so that even the youngest children could independently determine to which square to move. This activity also came from the list of unusual activities (Abegglen, 1998), and was chosen because few children were likely to have played a board game in this way.

Digestion was chosen as the topic of the game because discussions with local second-grade teachers indicated that children in the second grade would not have studied digestion. Inasmuch as the goal of the current research was to create a controlled script for the participants, novelty of the event, including both the topic matter and the game process, was important. Digestion was chosen because it had not yet been covered in an academic environment, because it did not include sensitive information such as might be found in discussing reproduction, because very young children and school-age children display interest in food and the changes it undergoes during the digestive process (Koeppel, 1995), and because materials were available to create the body diagram and organs necessary for the task. These materials included information regarding the functioning of the digestive organs written for young children in the age range of the current project (Carratello, 1980). It was important to include age-appropriate materials in order to ensure that suggestibility effects were not due to difficulties in comprehending the material.

Table 1
Event Target Items For the Memory Interview

Activity	Session 1	2	3	4
name tag	flag	flag	flag	planet
rolls die	RA, alternating	P, Alternating	RA	P
Chart # 1	lab coat	lab coat	lab coat	scrubs
Chart #2	lightband	lightband	lightband	scrubcap
Chart #3	mask	mask	mask	mask
Chart #4	stethoscope	steth	steth	steth
Chart #5	magnifying glass	mag glass	mag glass	mag glass
Chart #6	science case	science case	science case bag	digestion
board moves	draw cards	draw cards	draw cards	draw cards
who moves	RA, alternating	RA and P	P only	P, alt
facial feature	hair	eyes	nose	none
lands on color	organs	organs	organs	organs
pink block	teeth	teeth	teeth	tongue
green block	esophagus	esophagus	esophagus	esophagus
red block	stomach	stomach	stomach	stomach
purple block	pancreas	pancreas	pancreas	pancreas
blue block	gall bladder	gall bladder	gall bladder	liver
yellow block	small intestine	small intestine	small intest	lg intest
teeth fact	fixed	fixed	fixed	n/a
tongue fact	n/a	n/a	n/a	fixed

Table 1--Continued

Activity	Session 1	2	3	4
esophagus fact	fixed	fixed	fixed	fixed
stomach fact	varied	varied	varied	varied
pancreas fact	fixed	fixed	fixed	fixed
gall bladder	fixed	fixed	fixed	n/a
liver fact	n/a	n/a	n/a	fixed
small int.	fixed	fixed	fixed	n/a
large int.	n/a	n/a	n/a	fixed
organ placer	RA, alternating	P, alternating	RA	P
body location	back wall	left wall	right wall	door wall
food organs	teeth/small int.	esophagus/pancreas	teeth/g. blad.	stomach/ lg.int
last organ	P	P and RA	P	RA
sticker	pooh	animals	looneys	mickey
"gift"	picture	notebook	medals	certificate

The overall event included 10 components that were the same in every session (fixed), 10 components that varied only in the target session (varied once), and 10 components that varied in every session (always varied) (see Table 1). In order to determine which aspects of the event were central and peripheral, 60 adult raters reviewed the event procedure and rated each item listed in Table 1 as central or peripheral. Centrality was defined as the degree to which information was relevant to the plot (movement and definition) of the event (Heuer & Reisberg, 1992). Items that received a central rating from at least 80% of the raters (21 questions) and items that received a peripheral rating from at least 80% of the raters (19 questions) were incorporated into questions for the memory interview.

Procedure

Each child participated in either two or four event sessions, and a memory interview. The sessions were separated by an average of 8.9 days (range = 7 to 14 days). All sessions were videotaped. In the event sessions, participants played a novel game (Exploring Digestion) designed for this study. The children rolled a die to determine the order for dressing up as a scientist, and then drew cards to move around a game board, receiving organs when they landed on specified blocks. The organs contained simple facts about digestion, and could be placed on a large body diagram. The event was designed to provide 33 target items (see Table 1) which were the subject matter of the memory interview.

After the signed and dated consent form was received from the parents, each child was asked to participate. When the child agreed, two researchers accompanied the child to the testing room. Two researchers were present with the child throughout each

session. One researcher played the game with the child while the second researcher videotaped the session.

At the beginning of each session, the researcher wrote the child's name and the researcher's name on name tags, and the name tags were put on. Next, the child heard instructions for playing the game, "Exploring Digestion." During the first part of the game, both players (the researcher and the participant) dressed up as scientists. To begin the game, a player rolled the die, and then put on the item that corresponded with the number rolled, according to the game chart. For example, if the child rolled a "3," the child put on the lab coat. The order in which the clothes were donned varied in each session. The game continued until both players had all six items (lab coat, stethoscope, magnifying glass, surgical mask, science case, and light band). Then, the players moved to the board, which was placed on the floor, away from the dress-up area. The board was a tarp with colored squares. The players were the game pieces. To start the board game, the researcher attached a feature to the face of the body diagram to which the digestive organs were attached. During this portion of Exploring Digestion, the players drew cards, and then moved to the colored square corresponding to the card. Once on the correct block, the player picked up the organ for that block (the organs were attached to the block via Velcro). The researcher read the fact on the organ out loud two times. Then a player placed the organ in the correct spot on the body figure. The body figure was located in different places around the room during each session. After all of the organs had been placed on the body, the participant examined two organs with a magnifying glass, looking for the miniature food. (One organ at each session had a very small food item hidden on it.) When the participant found the food, (s)he received a sticker. Both

players removed the dress up clothes, the child received a "prize" (a certificate, a medal, a notebook, or a Polaroid of the child), and the child returned to class.

The memory interview was administered during a third or fifth session with each child, depending on the number of event sessions the child received. The memory interview asked children about the target items using general probes, direct probes, and forced-choice (yes/no) questions (see Appendix A). Two general probes, 12 direct probes, and 28 forced-choice questions asked participants about information that was central, peripheral, and fixed or varying in the event. The forced-choice questions were designed to measure suggestibility, and included 16 misleading questions utilizing the "Didn't you..." format (e.g. Didn't the nametag have planets on it?) and 12 non-misleading questions (e.g. Did you put on lab coats?). The interview questions were randomly ordered and then presented in a constant format to each child.

For the memory interview session, the child and two unfamiliar researchers returned to the room in which the game had been played and sat at a table. One researcher asked the child a series of questions relating to the child's target experience of playing "Exploring Digestion" (see Appendix A). The final episode of the event was the target experience or episode for each child (see Table 1). After completing the interview, the child received a sticker and was returned to class.

Coding

Free recall responses were transcribed and coded as "correct" or "incorrect" units of information. For example, the statement, "I stuck the organs on the body" obtained one correct point for "I," one for "stuck," one for "organs," and one for "body." Incorrect responses were coded as "internal" or "external." This coding scheme closely

follows the coding scheme used by Hayes and Delamothe (1997) and Hudson and Nelson (1986). Information was coded as "correct" if it matched what occurred during the target episode of the event. Responses were coded as incorrect when the information recalled did not occur during the target event. If the incorrect response provided information related to the script such that what was recalled did occur in one of the first three episodes, the response was coded as "internal." If the incorrect response provided information that was never a part of any episode of the event, the response was coded as "external". Responses to general probes were also coded according to the number of event activities mentioned. Five event activities occurred: dressing up like a scientist, moving around the board, putting the body parts on the body, looking for food in the body parts, and removing the dress up clothes to return to class. One coder coded 100% of the transcripts, and a second coder coded 25% (12) of the transcripts to obtain interrater reliability. The proportions of agreements to total judgments (agreements + disagreements) were 97% for "correct" versus "incorrect" judgments, 100% for "internal" versus "external" judgments, and 96% for event activities. Disagreements were resolved through discussion.

Responses to direct probes and forced-choice questions were also coded as "correct" or 'incorrect" in the same manner as general probes, including designations of "internal" and "external" for errors.

RESULTS

The hypotheses did not anticipate gender effects or effects of delay between sessions. Therefore, gender and delay effects were examined prior to conducting the main analyses, to determine whether either variable should be included in those analyses. Initial one-way analyses of variance with gender as the independent variable indicated no gender effects for the number of items correctly recalled for forced-choice questions, $F(1, 46) = .078$, $p > .78$, direct probes, $F(1, 46) = .253$, $p > .61$, or general probes, $F(1, 46) = .07$, $p > .79$. All further analyses did not include gender as a variable.

To determine whether the delay between sessions affected performance, Pearson correlations were performed among the length of average delay between sessions, the number of forced-choice questions correctly answered, the number of direct probes answered correctly, and the amount of correct information given in response to general probes. All correlations were less than $r(48) = .12$, $p > .19$. Average delay was not related to memory performance and therefore was not included in further analyses.

The primary analyses utilized proportions of number of errors divided by total responses to forced-choice questions in order to address issues of suggestibility. Additionally, secondary analyses utilized proportions of correct responses divided by total responses to general probes and direct probes in order to assess recall performance.

Suggestibility

A 2 (age: younger vs. older) x 2 (event frequency: 2 visits vs. 4 visits) x 2 (information centrality: central vs. peripheral) x 3 (information variability: fixed, varied once, always varied) mixed-model analysis of variance (ANOVA), with age and event frequency as the between-subjects variables and all other variables as within-subjects variables, was performed on the proportion of incorrect responses to the forced-choice questions (see Appendix B for cell means). With respect to the first hypothesis, a main effect of age showed that older children were less suggestible than younger children (M = .28, SD = .17, M = .40, SD = .17, respectively), $F(1, 44) = 18.12$, $p < .001$. Contrary to expectation, a main effect of centrality demonstrated that the children made more errors regarding central information (M = .36, SD = .14) than peripheral information (M = .31, SD = .13), $F(1, 44) = 7.22$, $p < .01$. However, this effect was mediated by a centrality by age interaction, $F(1, 44) = 6.80$, $p < .01$. The younger children performed more poorly in answering questions about central aspects of the event (M = .45, SD = .12) than in response to questions regarding peripheral aspects of the event (M = .35, SD = .13), $t(23) = 3.95$, $p < .001$. The older children responded no differently to questions for central information (M = .28, SD = .09) than to questions for peripheral information (M = .28, SD = .13).

Additionally, the analysis resulted in a main effect of variability, $F(2, 88) = 24.00$, $p < .001$. The children were less suggestible when questioned about fixed items (M = .24, SD = .13) than when questioned about varied once items (M = .43, SD = .21), $t(47) = 7.15$, $p < .001$, or always varied items (M = .39, SD = .16), $t(47) = 5.62$, $p < .001$. These effects were qualified by an age by event frequency by variability interaction, $F(2,$

88) = 6.29, $p < .003$ (see Figure 1). Experience mediated the children's performance such that the two groups of younger children and the older children who participated in two sessions responded in the same pattern, while the older children with four sessions responded differently. As can be seen in Table 2, the younger children with two event sessions made fewer errors when asked about fixed items than when asked about items that varied once, $t(11) = 2.87$, $p < .02$, and items that always varied, $t(11) = 2.28$, $p < .04$. The difference between items that varied once and items that always varied was not significant for younger children with two event experiences, $t(11) = .67$, $p > .51$. Younger children with four event sessions responded in the same pattern: Fewer errors were given regarding fixed items than items that varied once, $t(11) = 11.65$, $p < .001$, and items that always varied, $t(11) = 6.00$, $p < .001$. Additionally, these children responded with fewer errors when answering questions involving items that always varied than when answering questions about items that varied once, $t(11) = 2.76$, $p < .02$. Nevertheless, experience did make a difference. The younger children who experienced four event sessions were more suggestible regarding items that varied once than were younger children who experienced two event sessions, $t(22) = 2.29$, $p < .03$. The younger children's performance did not differ significantly according to amount of experience for fixed items, $t(22) = .00$, $p > .99$), or always varied items, $t(22) = .85$, $p > .40$.

The older children who experienced two event sessions made fewer errors regarding fixed items than regarding items that varied once, $t(11) = 4.02$, $p < .002$. Although responses regarding always varied items did not differ significantly from responses regarding fixed items, $t(11) = .83$, $p > .42$, or varied once items, $t(11) = 2.04$, $p > .06$, the older children with two event experiences did respond in the same pattern as

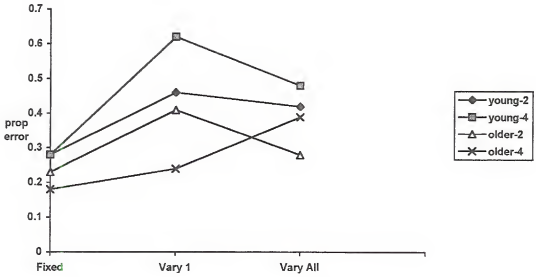

Figure 1: Interaction of Age, Event Frequency, and Variability

Table 2
Descriptive Statistics for Errors to Forced-Choice Questions by Variability, Event Frequency and Age

	Younger		Older		Total	
Variability	M	SD	M	SD	M	SD
2 Sessions						
Fixed	.28	.10	.23	.16	.25	.13
Varied Once	.46	.17	.41	.17	.44	.17
Always Varied	.42	.19	.28	.13	.35	.17
4 Sessions						
Fixed	.28	.12	.18	.14	.23	.14
Varied Once	.62	.17	.24	.15	.43	.25
Always Varied	.48	.15	.39	.10	.43	.13

both groups of younger children (see Figure 1). However, older children with four event experiences responded in a different pattern than the other three groups. Older children who participated in four sessions made more errors regarding always varied information than fixed information, $t(11) = 4.97$, $p < .001$, and information that varied once, $t(11) = 4.02$, $p < .002$. Older children with four event experiences did not respond differently to questions involving fixed items and items that varied once, $t(11) = 1.48$, $p > .16$.

Also, the older children benefited from increased experience when answering questions about items that varied once: Their errors decreased significantly after four sessions compared to two sessions, $t(22) = 2.63$, $p < .02$. Thus, with increased experience, the older children became better able to discriminate suggested items from target items (items that were present in the target session) for the varied once category. The varied once category was comprised of target items that were experienced only in the target session, and suggested items that were experienced in the remaining sessions (either one or three times), or not at all. However, increased experience worked to the detriment of the older children when the questions involved always varied items. The older children who participated in four sessions made more errors regarding always varied items than did the older children who participated in two sessions, $t(22) = 2.33$, $p < .03$. The always varied category included items experienced only once. Thus, correct items were present only in the target session, and suggested items occurred in one of the other sessions, or not at all. The older children's performance regarding fixed items did not differ according to event experience, $t(22) = .74$, $p > .46$.

Thus, experience affected the two age groups differently. The younger children responded in the same pattern regardless of experience, but were more suggestible when asked about items which varied once after four sessions than after two sessions. The older children who experienced four sessions were more suggestible as to which always varied item was present during the target session, but less suggestible regarding the varied once target items. The expected interaction among age, centrality of information, variability of information, and event frequency was not significant, $F(2, 45) = .46$, $p > .64$.

To test the hypothesis regarding question type, a 2 (age) x 2 (question type: misleading vs. non-misleading) x 2 (information variability) x 2 (event frequency) mixed-model ANOVA was performed with proportions of errors in response to forced-choice questions as the dependent variable (see Appendix C for cell means). The analysis revealed a main effect of age. As before, the younger children were more suggestible ($M = .40$, $SD = .17$) than were the older children ($M = .28$, $SD = .17$), $F(1, 44) = 16.08$, $p < .001$. Additionally, the analysis yielded a main effect of question type. Contrary to expectation, the children selected more incorrect responses to non-misleading questions ($M = .42$, $SD = .15$) than to misleading questions ($M = .29$, $SD = .12$), $F(1, 44) = 68.97$, $p < .001$.

An age by question type interaction showed that both age groups made more errors in response to non-misleading questions, $F(1, 44) = 6.20$, $p < .02$. The younger children were incorrect in responding to almost half of the non-misleading questions ($M = .46$, $SD = .14$), while they responded incorrectly for just more than a third of the misleading questions ($M = .37$, $SD = .10$), $t(23) = 4.15$, $p < .001$. The older children made fewer errors overall than the younger children ($t(46) = 1.87$, $p < .07$, for non-

misleading questions and $t(46) = 5.78$, $p < .001$, for misleading questions), but were incorrect more often in response to non-misleading questions ($M = .38$, $SD = .14$) than to misleading questions ($M = .21$, $SD = .08$), $t(23) = 6.24$, $p < .001$.

The expected interaction among age, question type, information variability, and event frequency was not significant, $F(2, 88) = .80$, $p > .45$. Nevertheless, the analysis resulted in a question type by variability interaction, $F(2, 88) = 4.56$, $p < .01$ (see Figure 2). For misleading questions, the children made fewer errors in answering questions about fixed items ($M = .15$, $SD = .12$) than in answering questions about varied once items ($M = .39$, $SD = .22$), $t(47) = 7.80$, $p < .001$, or in answering questions about always varied items ($M = .37$, $SD = .18$), $t(47) = 7.16$, $p < .001$. Responses to questions regarding varied once items and always varied items did not differ, $t(47) = .52$, $p > .60$. For non-misleading questions, the children also made fewer errors regarding fixed items ($M = .35$, $SD = .22$) than varied once items ($M = .54$, $SD = .25$), $t(47) = 4.67$, $p < .001$. However, unlike their performance on misleading questions, the children made fewer errors for always varied items ($M = .42$, $SD = .22$) than for varied once items, $t(47) = 2.50$, $p < .02$, in response to non-misleading questions.

Intrusions. Planned comparisons were conducted to test expected differences in the types of errors made by the children in response to forced-choice questions. It was expected that the children, regardless of age, would make more errors involving information internal to the memory script (internal intrusions) than errors involving information not provided during the event sessions. This hypothesis was confirmed ($t(47) = 8.96$, $p < .001$; $M = .71$, $SD = .22$, and $M = .40$, $SD = .26$ for internal and external

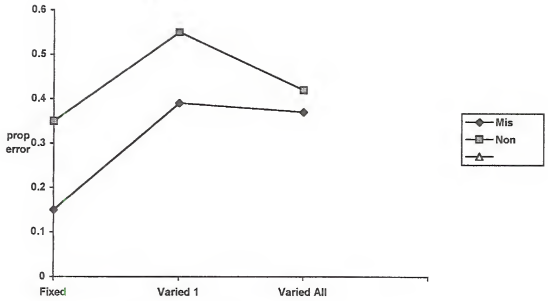

Figure 2: Interaction of Question Type and Variability.
Note. Mis stands for misleading questions and Non stands for non-misleading questions.

intrusions respectively). Also as expected, the children made more errors providing internal intrusions about varied once items than internal intrusions about always varied items, $t(47) = 4.42$, $p < .001$. Repetition of the event usually results in more recall errors involving items present in other occurrences of the event, and when this error is made, the most frequently occurring instance of the erroneously recalled item is provided as a response (Powell & Thomson, 1996).

Additionally, internal intrusions relevant to information centrality differed according to event experience. The children chose more internal intrusions than external intrusions in response to questions about central components, regardless of event experience ($t(47) = 10.68$, $p < .001$; $M = .79$, $SD = .24$, and $M = .37$, $SD = .28$, for internal and external intrusions respectively). However, in response to questions regarding peripheral components of the event, the children with four event experiences made more internal errors ($M = .69$, $SD = .32$) than did children with two event sessions ($M = .40$, $SD = .29$), $t(46) = 3.27$, $p < .002$.

Children in both age groups were expected to indicate more external intrusions when questioned about items that always varied than when questioned about fixed items or items that varied only in the target episode. As can be seen in Table 3, the children chose more external intrusions when questioned about fixed items than when questioned about always varied items, $t(47) = 3.63$, $p < .001$, and more external intrusions when questioned about items which varied once than when questioned about always varied items, $t(47) = 3.54$, $p < .001$. External intrusions regarding fixed items did not differ significantly from external intrusions for varied once items, $t(47) = .46$, $p > .64$.

Table 3
Descriptive Statistics for Intrusions

	Younger		Older		Total	
Intrusion Type	M	SD	M	SD	M	SD
External Fixed	.57	.23	.31	.31	.44	.30
External Varied Once	.58	.32	.26	.28	.42	.34
External Always Varied	.33	.48	.08	.28	.21	.41
Internal Varied Once	.90	.21	.79	.29	.84	.26
Internal Always Varied	.76	.23	.55	.22	.66	.25

Also, as expected, younger children made more errors involving internal intrusions (M = .81, SD = .19) than did older children (M = .61, SD = .21), $t(46) = 3.30$, $p < .002$, and younger children answered with more external intrusions (M = .54, SD = .22) than did older children (M = .27, SD = .23), $t(46) = 4.18$, $p < .001$.

Recall Performance

Direct probes. A repeated measures ANOVA (a 2 (age) x 2 (event frequency) x 2 (information centrality) x 3 (information variability) mixed-model ANOVA) was conducted with the proportion of correct responses to direct probes as the dependent variable. A main effect of age showed that older children provided more correct responses (M = .44, SD = .36) than did younger children (M = .27, SD = .30), $F(1, 44) = 12.45$, $p < .001$.

Additionally, the analysis yielded a centrality by variability interaction, $F(2, 88) = 6.81$, $p < .002$. As can be seen in Figure 3, performance differed only on items that varied once. The children provided more correct responses to questions regarding internal intrusions, central items that varied once (M = .52, SD = .36) than to questions regarding peripheral items that varied once (M = .27, SD = .45), $t(47) = 3.07$, $p < .004$. All other comparisons were not significant, $ts < 1.25$, $ps > .22$. However, this interaction was qualified by an age by centrality by variability interaction, $F(2, 88) = 3.60$, $p < .03$ (see Figure 4). The pattern of results for answers to questions involving central items is the same for both age groups, with only the responses about fixed items differing significantly (M = .42, SD = .38, for older children and M = .19, SD =.25, for younger children), $t(46) = 2.47$, $p < .02$ (all additional $ts < 1.39$, $ps > .17$). When the children were questioned about peripheral information, the patterns of responding changed. As can be

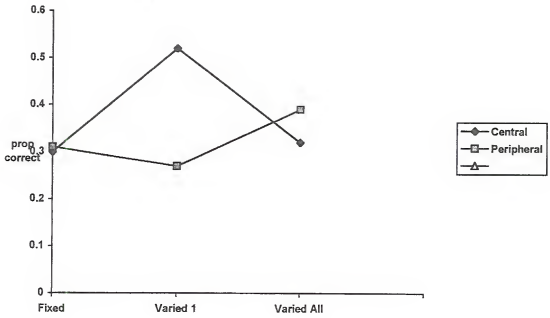

Figure 3: Interaction of Centrality and Variability in Response to Direct Probes

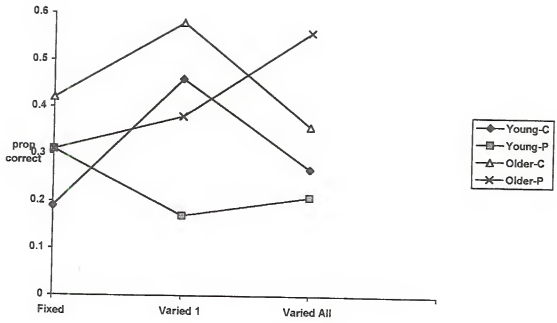

Figure 4: Interaction of Age, Centrality, and Variability in Response to Direct Probes

seen in Figure 4, younger children's performance declined as items became more varied, while older children's performance improved. Younger children correctly answered few questions about always varied items ($M = .21$, $SD = .25$) while older children performed much better ($M = .56$, $SD = .31$), $t(46) = 4.38$, $p < .001$ (all other comparisons between age groups, $ts < 1.64$, $ps > .11$).

General probes. The children provided very little information in response to the general probes: an average of 3.54 units of information. Therefore, the proportion of correct units of information was analyzed only by age and event frequency. The analysis yielded a main effect of age, with older children providing more correct responses ($M = .91$, $SD = .22$) than did younger children ($M = .46$, $SD = .47$). The children made only 20 errors (11%), and those errors were made by only 15 children, 9 of whom were in the younger age group. Because so few incorrect responses were given, the errors could not be analyzed. However, of those 20 errors, 7 (35%) were and the remaining 13 errors (65%) were external intrusions. Event frequency was not related to performance in response to direct or general probes.

Memory and Suggestibility

To examine possible associations between scripted recall and suggestibility, the children's answers to the general probes were coded according to the number of script activities mentioned. An average of 1.6 activities were mentioned during the free recall (with 5 activities as the maximum possible). Pearson correlations were performed among number of activities mentioned, total errors in response to the forced-choice questions used to measure suggestibility, and the total correct responses to direct probes in order to examine the relationship between recall and susceptibility to suggestion.

Table 4 shows the intercorrelations among the variables. Both the amount recalled in response to general probes and the amount recalled in response to direct probes are positively related to errors in response to suggestive questions. As the children remembered more from the target event, they were more suggestible. Thus, it appears that improved memory ability is not related to a decrease in suggestibility.

Table 4
Correlations Among Correct Memory Responses and Suggestibility Errors

Variable	1	2	3
1. Activities	--	.26	.54
2. Suggestibility		--	.51
3. Direct Probes			--

Note. All correlations significant at $p < .03$ or below.

DISCUSSION

The purpose of the present study was to examine the effects of scripted knowledge on suggestibility and recall of a specific instance of a controlled, repeated event. Specifically, this research addressed questions regarding age, event experience, information variability, question type, information centrality, and level of recall as they pertain to both suggestibility and script memory. As expected, the older children were less suggestible than were the younger children, and the older children recalled more in response to direct and general probes than did younger children.

Information Variability

In response to the forced-choice questions, performance concerning information variability was mediated by both age and event experience. Both groups of younger children and the older children who participated in two event sessions responded in the same pattern. These children were least suggestible when responding to questions about items that never varied. For children with two event experiences, the varied once category and the always varied category appeared the same. Because these children had experienced only two variations of the event, they received two exemplars in the always varied category, and two exemplars in the varied once category. The younger children who experienced four event sessions were more suggestible for varied once items than for always varied items. The pattern of responding changed, however, for the older

children with four event experiences. These children were more suggestible when asked about always varied items than fixed or varied once items.

More importantly, experience also made a difference within the age groups. The younger children with more event experience were more suggestible regarding varied once items than were the children with two event sessions. However, the effect was reversed for the older children. Older children with four event sessions were less suggestible in response to questions about items that varied once than were older children with two event sessions. In regard to always varied components, the older children with two experiences were less suggestible than were the older children with four event experiences.

The pattern of results obtained can be interpreted utilizing script theory and the schema-confirmation deployment hypothesis. Scripts are comprised of abstracted components of an event that are the same or similar across experiences (Nelson & Gruendel, 1986). Therefore, it is not surprising that the children were less suggestible regarding fixed information than other types of information. Previous findings have also shown that children are better able to recall stable events compared to events that change over time (Bauer & Fivush, 1992; Fivush et al., 1992; Murachver et al., 1996).

Age- and experience- related differences in performance can be accounted for by the schema confirmation-deployment hypothesis. The participants in this study experienced a novel event. Arguably, the event was unusual enough that the participants did not have a memory script appropriate for understanding the event. Initially, therefore, the children were in the schema-confirmation phase. Although children in the current project experienced the event multiple times, the event was rather complex and

might require several experiences for scripts to be formed by such young children. Research indicates that while even 3-year-olds can form skeletal scripts after only one experience (Nelson, 1986), the more complex the event, the more experience is needed for children to form a script complete enough to allow them to move quickly through schema-confirmation to schema-deployment (Farrar & Goodman, 1990). In the current research, the participants experienced the event either two or four times. Therefore, at least skeletal scripts existed, but, because of the complexity of the event, these scripts were not likely to contain a great number of features.

In their research examining the schema confirmation-deployment hypothesis (Farrar & Goodman, 1990, 1992), Farrar and Goodman concluded that if a script is still being formed, a person will have more difficulty establishing an episodic memory for a particular instance of an event because that instance is being used in the script formation. Hence, in the current study younger children were dependent on their scripts for memory information, which led the younger children who experienced the event four times to be more suggestible regarding varied once items than the younger children who experienced the event twice. The event script is most likely to contain the item exemplar that was experienced three times rather than the exemplar experienced only once. The younger children with four experiences would therefore incorrectly choose the suggested item. The schema confirmation-deployment hypothesis posits that if a schema exists for an event, during the confirmation phase schema-consistent information is more likely to be recalled than schema-inconsistent information (Farrar & Goodman, 1990). The results obtained in response to direct probes further support this explanation: Younger children provided fewer correct answers as variability increased.

The older children with four event experiences were likely to possess more fully developed scripts than the younger children with the same amount of experience, or the older children with less experience. Consequently, these older children were more likely to be in the schema deployment phase. The schema confirmation-deployment hypothesis postulates that during the schema deployment phase, information that is consistent with the script takes little processing since it is expected. Script-inconsistent information can then be processed and distinct episodic memories may be formed (Farrar & Goodman, 1990). Accordingly, older children in the present study with four event experiences were better able to remember the items that varied only in the target episode than were the remaining three groups of children. Again responses to direct probes confirm this explanation, inasmuch as older children provided more correct responses as variability increased.

Moreover, the more-fully developed scripts of the older children with four event experiences may have included open slots which represented an aspect of the event that was expected to change. Event variations are represented in a script as lists of alternatives which can fill a particular slot within the script, without markers for the specific occasion in which they were originally experienced (Hudson et al., 1992). As a result, the scripts of the older children with more experience would include the always varied exemplars, but the children would be unable to distinguish which exemplars corresponded to which experiences. Thus, the older children with four event sessions were more suggestible regarding always varied items than were the older children with two event sessions.

The pattern of intrusions regarding information variability obtained in the present study further demonstrates the children's script dependence. When the children made errors in response to suggestive questions for varied once components, their errors more often involved items internal to the script than items external to the script. That is, in committing errors, the children more often agreed to items that were a part of the event during at least one of their experiences, but that were not a part of the target episode (or disagreed that items were from the target episode when the items were in fact a part of that episode). Most of the children's errors, then, were consistent with the overall script of the event, but were not accurate regarding the individual target episode. Several researchers (Farrar & Goodman, 1990; Fivush & Nelson, 1982; Hudson & Nelson, 1983) suggest that young children are more script dependent in recalling events, and so children incorrectly report more script-based information in recalling individual episodes than do older children. The pattern of errors obtained in the present study shows the children to be script dependent. Thus, these children were able to recall some items from the event. As their script-knowledge improved, they recalled more. The script confirmation-deployment hypothesis suggests that the children's inability to recall the target episode is because that episode is involved in script formation/confirmation. Instead, the children based their decisions regarding the target episode on their scripts for the event.

Recall that both groups of younger children and the older children with less experience responded to the forced-choice questions following the same pattern, but the older children with four experiences responded in a pattern that indicated these children had reached the deployment phase. Nevertheless, the intrusions analysis did not yield age differences. However, post hoc examination of the internal intrusions indicated that

the difference between the number of internal intrusions for the varied once category as opposed to the always varied category was only significant for both groups of younger children and the older children with two event experiences. The older children with four experiences did not respond with internal intrusions for varied once and always varied items at a different rate.

Question Type

Contrary to expectations, the children in the current study were more suggestible in response to non-misleading questions than in response to misleading questions. Although question type interacted with age and information variability, both age groups performed more poorly when answering non-misleading questions, and the interaction pattern with information variability mirrored the information variability results. That is, for both non-misleading and misleading questions, the children made fewer errors in responding to questions about fixed items than about varied once or always varied items. In addition, for non-misleading questions, the children made fewer errors for always varied items than for varied once items.

Research examining suggestibility typically yields significant incorporation of misinformation by the children in response to misleading questions (see Ceci & Bruck, 1993, and Quas & Goodman, in press, for reviews). However, surprisingly few studies have included a comparison of responses to misleading and non-misleading questions to determine which question type leads to more errors (but see Welch-Ross, Diecidue, & Miller, 1997). Although several projects included both types of questions (Dale, Loftus, & Rathburn, 1978; Goodman et al., 1990; Goodman et al., 1994; Rudy & Goodman, 1991; Saywitz et al., 1991), none of these studies directly compared answers to the two

types of questions. Rather, non-misleading questions (referred to as specific or direct questions) were used as an additional index of memory, and were not considered to be suggestive. However, examination of the means of correct responses to both types of questions across studies reveals no impact of question type or improved accuracy for misleading questions over non-misleading questions. Because these analyses were not conducted by the researchers involved with the studies, it is not possible to determine if the differences are statistically significant. However, the pattern of differences in response to misleading and non-misleading questions across these projects appears similar to the findings in the current research.

How might the increased suggestibility for non-misleading questions over misleading questions be explained? Goodman (Goodman et al., 1990; Rudy & Goodman, 1991) advises that both types of questions are considered by some to be suggestive, especially in the legal arena. Misleading questions are obviously suggestive because they include a prompt to an answer (e.g. "Didn't the nametag have flags on it?"). Non-misleading questions are also suggestive, because they include specific information which the child must confirm or deny (e.g. "Did you put on the stethoscope first?"). Thus, non-misleading questions suggest an occurrence to the participant, and the participant must then decide the veracity of the suggestion. Children respond to both types of questions throughout their daily activities. Perhaps young children become more skilled at considering the accuracy of and responding to explicitly suggestive questions in the context of remembering. Mothers are known to use the "Didn't..." form of questions to prompt yes/no responses during memory conversations (Haden, 1998; Reese & Fivush, 1993). Nevertheless, mothers also ask straightforward yes/no questions during recall.

No conclusions can be drawn based on the existing research in this area. The issue of the impact of question type should be further examined in future research. Implications for interpretation of research results regarding suggestibility and for interviewing children in legal contexts underlie the importance of this issue.

Information Centrality

The younger children in the current research were more suggestible for central information than for peripheral information, while the older were children equally suggestible for both types of information. The results involving information centrality and suggestibility were in the opposite direction than anticipated, and differed from other studies involving information centrality which have found participants to be more suggestible for peripheral information than for central information (Cassel & Bjorklund, 1995; Christianson & Loftus, 1991; Goodman, Rudy, Bottoms, & Aman, 1990; Heuer & Reisberg, 1992; see also Christianson, 1992, for a review). At least two possible explanations are available. First, definitions of centrality categories vary considerably across researchers. In the present research, Heuer and Reisberg's (1992) definition restricting the central category to plot relevant information was used. Nevertheless, the current findings differ from those of Heuer and Reisberg. Second, the present study relied on adult ratings to categorize the items as central or peripheral. Perhaps items that are most salient or plot relevant to an adult are not the same components a child would rate as central. Katherine Nelson (1986) asserts that providing the child access to information considered relevant by the adult is no guarantee that this same information will be evaluated as relevant by the child. While this explanation is plausible, it does not consider the effect that repeated exposure to the event may have. The only other known

study to have examined information centrality utilizing a repeated event found no differences between central and peripheral information (Peterson & Bell, 1996).

Furthermore, the results relevant to information centrality in response to direct probes are not consistent with the suggestibility findings. The children in the present study provided more correct responses to direct probes addressing central varied once information than in response to direct probes addressing peripheral varied once information. (Significant differences in centrality were found only for varied once information.) This finding is consistent with many studies investigating centrality (Casual & Bjorklund, 1995; Goodman et al., 1990; Saywitz et al., 1991) which find better memory for central components of an event. Considered together, these two results mirror the overall suggestibility and memory results discussed below. Consequently, script theory and the schema confirmation-deployment hypothesis may explicate this pattern of results as well.

Memory and Suggestibility

Correlations among total number of activities correctly recalled in free recall, total correct responses to direct probes, and total errors in response to the forced-choice questions measuring suggestibility indicated that as the children recalled more correct information from the target event, they were also more suggestible in response to forced-choice questions about the target event. This finding is contrary to the generally held assumption that poorer memory leads to greater suggestibility due to the lowered likelihood that individuals will detect discrepancies between suggested and experienced information (Schooler & Loftus, 1993). Although many researchers link high suggestibility to poor memory (Brainerd & Reyna, 1988; Ceci, Ross, & Toglia, 1987;

Cohen & Harnick, 1980; Duncan, Whitney, & Kunen, 1982; King & Yuille, 1987; Loftus & Davies, 1984; Warren, Hulse-Trotter, & Tubbs, 1991), few studies have correlated suggestibility and recall in a with-in subjects design. Thus, the relation between recall of an event and suggestibility regarding that event has rarely been addressed.

In an investigation of suggestibility which included both free recall questions and misleading questions conducted by Warren et al., (1991), sixth grade children provided more information in response to general probes than the first grade children but less than the adults. Additionally, the sixth grade children were less suggestible than the first grade children but not more suggestible than the adults. The researchers concluded that memory was inversely related to suggestibility. Gudjonsson (1983) found these same results using the same procedure with adults.

However, this study, as well as studies by Ceci et al. (1987) and Brainerd and Reyna (1988, 1996) which yielded similar results, differs from the current study in one important aspect. The participants in those studies observed an activity, or heard a story. They were not actively involved in the event. Participation versus bystanding is known to yield different results in suggestibility (Baker-Ward, Hess, & Flannagan, 1990; Istomina, 1975; MacWhinney, Keenan, & Reinke, 1982; Murchaver et al., 1996; Rudy & Goodman, 1991; Tobey & Goodman, 1992). In the present research, the children played the game with the experimenter, and thus were actively involved in the procedure.

Goodman and Reed (1986) examined age differences in suggestibility and recall utilizing an experimental design which actively involved participants in playing a game with the experimenter. The results showed that while the 6-year-olds were more suggestible than the adults, they did not differ from adults in their memory for the event

as assessed through free recall. The researchers determined that strength of memory was not the source of suggestibility, and proposed that a number of factors, including the perceived authority of the interviewer and response bias might contribute to participants' acceptance of suggested information. The results in the current research also indicate that poor memory is not always associated with increased suggestibility. Additionally, the forced-choice questions in the current study were counterbalanced to eliminate response bias. That is, both correctly leading and misleading questions were included. To obtain a high suggestibility score, participants had to answer with both "yes" and "no" to different questions, so that a response bias in either direction would be minimized. Therefore, response bias does not seem to be a viable explanation for the current results.

Similarly, it is unlikely that the children in the present study were merely acquiescing to authority. First, the experimenter who conducted the interview was new to the participant, and the participants believed the experimenter to be naive to the event. Second, as with response bias, the participants had to answer "no" to receive a suggestible rating for approximately half of the forced-choice questions. Acquiescing to authority involves responding in the manner posed by the authority figure; it does not involve disagreeing with the authority figure.

Loftus, Levidow, and Duensing (1991), and Tousignant (1984, as cited in Schooler & Loftus, 1993) indicate that poor memory may not be associated with increased suggestibility. In these studies, adult participants who rated themselves as having good memory abilities were more likely to be influenced by the misleading information than were participants who reported poor memory abilities.

In the present research, the portions of the event recalled accurately via free recall during the interview could be drawn from the participants' recently formed script of the event. However, when asked to determine whether specific details were a part of the event, the participants needed to rely on the episodic memory of the event. Because that memory was engaged in script formation, the memory trace for the memory itself was unavailable. Unable to determine whether the details asked about were from the event or the post-event interview, the participants may have chosen the more salient scripted choice, thereby providing the misinformation as the answer. The participants appeared to have good memory for the event because they were able to recall aspects of the incident, but also they appeared to be suggestible because they incorrectly identified the misinformation provided in the interview. In this way, children and adults may have good memory for an event and at the same time be suggestible when questioned about that event. Thus, the schema confirmation-deployment hypothesis provides an explanation for the results in the present research findings, and may account for the findings in the studies by Goodman and Reed (1986), Loftus et al., (1991) and Tousignant (1984, as cited in Loftus et al., 1991), in which participants were also exposed to novel events.

Future Directions

Several issues were raised by the results in this study. First, research on script development indicates that open slots for variant components and lists of slot fillers develop as part of scripts. Yet, the interaction of age, event experience, and information variability suggested that the complexity of the event may influence the rate of development of the open slots. Research providing additional event experience across

age groups and including frequent memory testing might further reveal the developmental process of complex scripts.

Second, the present research involved an event that was chosen for its novelty, in order to monitor the development of the script for the event. However, the determination that children would not know about digestion was made by consulting age-appropriate teachers regarding school curriculum. Future research should attempt to replicate the findings here, including a pre-exposure interview with the participants to determine their level of knowledge regarding the event chosen. Ratings of the children's prior knowledge of the content and format of the event would help to eliminate confusions among scripts as an explanation for external errors.

Third, although adults provided ratings along the dimension of centrality for the exemplars used in the current research, the items were not rated for salience. Even though the experimenter implicitly attempted to equate and counterbalance items across categories, it is not known whether items in the fixed category were as memorable as items in the varied once category and always varied category, and so on. Nor is it known whether items external to the event which were suggested in the forced-choice questions are as salient as the script-consistent items they replaced. Thus caution must be used in interpreting the results of response comparisons across categories of variability and centrality. Future research should replicate the current investigation, adding independent ratings of item salience to be used in counterbalancing exemplars across the categories of information variability, question type, and information centrality.

Fourth, the impact of misleading and non-misleading questions, both of which are suggestive question types, should be further evaluated. No research to date has addressed

the reason for the differences in responses to these types of questions. Nevertheless, the finding that non-misleading forced-choice questions can lead to increased suggestibility has important implications for forensic interviewing. Although children's free recall responses to general probes often yield too little information to be useful in a legal context (Lamb et al., 1995), interviewers should be aware of the risks of utilizing yes/no questions. Research investigating implications of grammatical form and levels of linguistic understanding in regard to non-misleading suggestive questions might provide insight into methods of minimizing the risk of misinformation acceptance.

Additionally, although the schema confirmation-deployment hypothesis can account for most of the current findings, the model does not suggest any process or mechanism through which movement from confirmation to deployment might take place. More precise criteria for determining the phase of schema processing for individual scripts and a more precise accounting of the shift between phases are needed.

Finally, research in the legal arena might explore the utility of questions directed at the more general level of scripted recall as opposed to specific questions about individual episodes of abuse in pursuing the evidentiary testimony of children. A constitutional analysis considering any possible violations of the defendant's rights would elucidate the jurisprudential issues raised by this approach. More pragmatic concerns should also be addressed: Studies examining the willingness of the courts to develop and support such procedures and investigations of acceptance by jurors of such testimony for the purposes of fact finding and guilt determinations should also be conducted.

Implications of the Research

This research makes important contributions to the field in three ways. First, it is the first project to examine these specific questions of memory performance and suggestibility. Researchers have conjectured about the role of script memory in suggestibility, but they have not included examinations of scripted events in their studies (Ceci & Bruck, 1993; Goodman, Aman, Hirschman, & Saywitz, 1987). Only two other studies have considered the influence of scripts on suggestibility, and those studies did not encompass all of the questions examined here. The present study included an investigation of the effects of scripted memory on suggestibility and recall of a repeated event in regard to age, event experience, information variability, question type, and information centrality. This study is one of the first to correlate suggestibility in response to forced-choice questions with free recall. Although poor memory had been linked to suggestibility via inverse findings, the present research revealed that increased recall might also relate to suggestibility.

Also, the present research is one of the first studies to compare misleading and non-misleading suggestive questions. Most research categorizes the non-misleading questions as memory probes, not as suggestive questions (Goodman et al., 1990; Rudy & Goodman, 1991; Saywitz et al., 1991). However the results here indicated that children may be equally suggestible in response to both types of suggestive questioning.

Moreover, the present research is the first project to apply the schema confirmation-deployment hypothesis to suggestibility findings. More typically, results relevant to suggestibility are interpreted in terms of memory trace strength theory and source-monitoring theories. These theories indicate that suggestibility is a result of weak

memory traces whose features are not tightly bundled. Because the features of the trace are loosely connected, features related to source may not be included in the trace. Thus, weak memory traces which do not include source features are either too weak to be recalled (memory trace strength theory) or are not chosen in the decision process because of the lack of source information (source-monitoring theories), or both. While trace strength theory and source-monitoring theories account for a large number of results in the suggestibility literature, these theoretical approaches can neither separately nor together explain results such as the ones revealed in the present study. However, both theories can be integrated with script theory and the schema confirmation-deployment hypothesis. Knowledge increases with additional event experience via incorporation of the event into memory scripts (as either script-consistent or script-inconsistent information). Memory traces increase in strength with increases in knowledge, allowing more source-related features to be encoded. Memory for the event and the ability to correctly recall the source of different experiences should also improve. Thus, script theory complements the two most common explanations of suggestibility.

The results of this study will be of interest to researchers seeking to answer basic questions regarding the organization and functioning of memory. The explanation of results presented here provides additional support for the hypothesis that script and episodic memory are separate types of event memory. Scripts are general knowledge that define a category of occurrences, and as such, are a general set of expectations for the event. Episodic memory, however, is a form of event representation that is comprised of the specifics of an occurrence of an event (Fivush & Slackman, 1986). Scripts for events appear to develop prior to episodic event representations. Once a script is established for

the standard components of an event it is used to organize memory for specific episodes of the event (Hudson et al., 1992).

Third, the current research is of interest to those who must consider the viability of using children's recall in a legal setting. The reliability of children's testimony has been much disputed within the legal community, with opposing sides citing research to support each side's own view. That children are suggestible is not in doubt. However, the nature of that suggestibility, and the conditions under which it might be expected to escalate, are only now being addressed. In a forensic setting, children are usually considered to be correct or incorrect, and incorrect responses to questions about peripheral information may be just as damning as incorrect responses to central information. The extent to which children may be correct, but wrong about a specific episode of an event, has not been considered. However, this research provided evidence that children's errors are often related to other instances of the same event. That is, errors are frequently due to confusions among script-related items.

Child abuse is rarely a one-time occurrence (Herman, 1981). Indeed research involving victims of child maltreatment asserts that the victims usually form scripts of abuse (Goodman et al., 1987, 1994). Therefore, in making errors, it may be that children are recalling information based on their scripts in response to questions about abuse. While still errors, these errors are internal intrusions, and are of a different nature than errors involving information that never occurred. Although our current legal process dictates that individual episodes of abuse often must be recounted (in many states, the accused is entitled to respond to specific allegations of fact), errors that are not a part of the individual abusive episode but that are correct script information might still be

considered as accurate recall of maltreatment, and thus evidence of abuse. A better understanding of the ways in which scripts may influence recall and memory suggestibility may provide new alternatives within a forensic context. This study took a first step toward developing that understanding.

APPENDIX A
MEMORY INTERVIEW

I. General Questions

i. Can you tell me one thing that happened when you came in this room to play Exploring Digestion with _____?

ii. Do you remember wearing a badge one time? Was it the first time, or the last time you played Exploring Digestion?

I need to find out how much you can remember about the time you wore the badge during the Exploring Digestion game.

1. I'd like you to tell me everything that happened during the Exploring Digestion game on the day you wore the badge. Do you remember that time? What happened first?

2. What happened then?

II. Specific Questions

Now I need to know about certain parts of playing Exploring Digestion. We might have talked about some of this already, but I'm just double checking.

1. What did you put on before you started the game? (nametag)
2. Didn't the name tag have planets on it? (yes)
3. How did you know what part of the outfit to put on? (rolled die/looked at chart)
4. Who rolled the die? (Participant)
5. Did you put on lab coats? (no)
6. Didn't you get a liver? (yes)
7. Didn't you get a magnifying glass? (yes)
8. Didn't you look at the esophagus with the magnifying glass? (no)
9. Didn't you get a microscope? (no)
10. Did you get a pencil at the end of the game? (no)
11. Did you put on the _____ first? (yes)
12. Didn't _____ put the large intestine on the body? (no)
13. Did we know where to move on the board by spinning a wheel? (no)
14. Who went first? (Participant)
15. What did we get for landing on the color? (organs)
16. When we got a body part, did we put it on the body? (yes)
17. Did _____ say thank you at the end of the game? (yes)

18. Didn't ____ put hair on the body? (no)
19. Who put the organs on the body? (Participant)
20. Did ____ come to get you from class/call you on the 2-way radio to play? (yes)
21. What did _____ put on the body before you drew the first card? (nothing)
22. Didn't you get a stomach? (yes)
23. What color was the esophagus? (green)
24. Did the esophagus say " I help you breathe air?" (no)
25. Did we get a tongue? (yes)
26. What did it say on the stomach? (I mash the food into smaller pieces)
27. Didn't we look at the stomach with a magnifying glass? (yes)
28. Didn't you get a heart? (no)
29. Didn't you get a small intestine? (no)
30. What color was the liver? (blue)
31. What part did you get first? (tongue)
32. Didn't you get the lung last? (no)
33. Was there a banana in the stomach? (yes)
34. Did you get the last body part? (no)
35. What did you get at the end of the game? (certificate)
36. Didn't you receive a mickey mouse sticker? (yes)
37. Didn't you play the game outside on the playground? (no)
38. Didn't _____ help you put on the scrubs? (yes)
39. Was the tongue pink? (yes)
40. Was the large intestine blue? (no)

APPENDIX B
CELL MEANS FOR PROPORTIONS OF INCORRECT RESPONSES TO FORCED-CHOICE QUESTIONS REGARDING INFORMATION CENTRALITY AND INFORMATION VARIABILITY

Variable	Younger		Older	
	M	SD	M	SD
2 Sessions				
Central Fixed	.32	.13	.20	.17
Central Varied Once	.47	.18	.42	.13
Central Always Varied	.50	.50	.25	.38
Peripheral Fixed	.23	.17	.27	.23
Peripheral Varied Once	.40	.17	.31	.22
Peripheral Always Varied	.33	.23	.30	.16
4 Sessions				
Central Fixed	.30	.14	.15	.17
Central Varied Once	.60	.23	.27	.16
Central Always Varied	.50	.18	.41	.19
Peripheral Fixed	.25	.15	.23	.20
Peripheral Varied Once	.48	.20	.15	.17
Peripheral Always Varied	.43	.14	.40	.17

APPENDIX C
CELL MEANS FOR PROPORTIONS OF INCORRECT RESPONSES TO FORCED-CHOICE QUESTIONS REGARDING QUESTION TYPE AND INFORMATION VARIABILITY

Variable	Younger		Older	
	M	SD	M	SD
2 Sessions				
Misleading Fixed	.22	.10	.15	.12
Misleading Varied Once	.42	.20	.35	.19
Misleading Always Varied	.46	.19	.22	.15
Non-misleading Fixed	.35	.20	.31	.21
Non-misleading Varied Once	.57	.22	.57	.17
Non-misleading Always Varied	.35	.27	.38	.17
4 Sessions				
Misleading Fixed	.18	.10	.07	.10
Misleading Varied Once	.57	.19	.21	.22
Misleading Always Varied	.44	.11	.37	.18
Non-misleading Fixed	.40	.20	.33	.29
Non-misleading Varied Once	.72	.19	.30	.22
Non-misleading Always Varied	.50	.21	.46	.21

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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation as is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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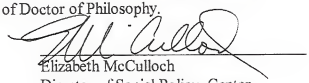

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